

Chickenpox and Shingles

(Chickenpox is also known as Varicella.
Shingles is also known as Herpes Zoster.)

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Chickenpox and shingles are caused by varicella zoster virus (VZV), a DNA virus belonging to the herpes virus group. Primary infection with VZV causes **chickenpox**. Like other herpes viruses, VZV has the capacity to persist in the body as a latent infection after the primary infection. **Shingles**, also known as herpes zoster, results from reactivation of the latent infection.

B. Clinical Description

Chickenpox is characterized by a pruritic (itchy), maculo-papulovesicular rash that evolves into dried crusts over a 5- to 6-day period. All three types of lesions (macules, papules and vesicles) are present at the same time, and they tend to be more abundant on covered parts of the body and can also occur on mucosal surfaces. Fever and constitutional symptoms precede the rash by 1–3 days. Mild, atypical, and inapparent infections occur. The disease is usually mild among children, and can be more severe in adolescents and adults. Immunity is generally lifelong. Symptomatic reinfection is rare in healthy persons, although asymptomatic reinfection does occur.

Complications include pneumonia (viral and bacterial), secondary bacterial infections, thrombocytopenia, arthritis, hepatitis, encephalitis or meningitis, glomerulonephritis, and death (1 per 100,000 children aged 5–9 with varicella; 1 per 5,000 adults). Invasive group A streptococcal disease has been reported increasingly as a complication and can result in cellulitis, necrotizing fasciitis, septicemia, and toxic shock syndrome. While pneumonia is unusual in healthy children, it is the most common complication in adolescents and adults.

Pregnant women, immunocompromised persons, children less than 1 year old, some adolescents, adults, patients with chronic cutaneous or pulmonary disorders, and patients receiving systemic corticosteroids or chronic salicylate therapy are more likely to experience serious complications with chickenpox. The risk is especially high when corticosteroids are given during the incubation period for chickenpox. However, healthy children may also develop serious complications and even die from chickenpox.

Infants born to women who developed varicella within the period of 5 days before delivery to 2 days after delivery are at risk of neonatal varicella, which can be fatal. Congenital varicella syndrome, characterized by developmental abnormalities, encephalitis, mental retardation, and low birth weight, may occur among 0.7–2.0% of infants born to women infected with varicella during the first half of pregnancy.

Reactivation of latent VZV infection results in **shingles**, a red, painful, itchy and blistery rash typically in one area on one side of the body in the distribution of a nerve. There is usually no fever or other systemic symptoms. Pain and itching in the area of the shingles may persist after the lesions have resolved (post-herpetic neuralgia). Shingles can be treated with several antiviral agents. Shingles can occasionally become serious in immunocompromised persons, with generalized skin eruptions and central nervous system, pulmonary, hepatic, and pancreatic involvement.

C. Reservoirs

Humans are the only host.

D. Modes of Transmission

VZV is transmitted person-to-person by the following means:

1. From chickenpox cases:
 - airborne
 - droplets
 - direct contact with nasopharyngeal secretions or lesions of an infected person
2. From shingles cases:
 - direct contact with lesions
3. From disseminated shingles cases, or localized shingles cases in the immunocompromised:
 - airborne
 - direct contact with lesions

Chickenpox is highly infectious, with secondary infection rates in susceptible household contacts approaching 90%. Exposure to chickenpox does **not** cause shingles. Exposure to shingles can result in chickenpox in a susceptible person, but **cannot** cause shingles.

E. Incubation Period

The incubation period for **chickenpox** is usually 14–16 days, with a range of 10–21 days. This period may be prolonged for as long as 28 days by use of varicella zoster immune globulin (VZIG) and shortened in immunocompromised patients. **Shingles** has no incubation period; it is caused by reactivation of latent infection from primary chickenpox disease.

F. Period of Communicability or Infectious Period

The infectious period for **chickenpox** is as long as 5 but usually 1–2 days before the rash appears and until all of the vesicles have formed scabs, usually within 5 days of rash onset. Contagiousness may be prolonged in immunocompromised patients. The infectious period for **shingles** is until all lesions have crusted over.

G. Epidemiology

Chickenpox occurs worldwide, although incidence is lower in the tropics than in the temperate zones. In the United States, incidence is highest between March and May, and lowest between September and November. Most cases of varicella in the United States occur in children younger than 10 years of age.

Changes in the epidemiology of chickenpox are anticipated as an increasing proportion of children in the United States become protected by vaccination. In the late 1990s, just a few years after vaccine licensure, significant decreases in incidence were already being seen in some areas of the US. It will be important to continue to watch for changes in age-specific incidence and severity of chickenpox.

Shingles is found worldwide and has no seasonal variation. The most striking feature in the epidemiology of shingles is the increase in incidence found with increasing age. Approximately 15% of the general population will experience shingles during their lifetime.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- Aggregate numbers of clinically diagnosed cases of chickenpox, broken down by age group.
- Unusual case(s)/clusters as outlined in Section 3) B (page 4).
- Deaths where chickenpox was a contributing cause.

Note: See Section 3) B and 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

1. **Chickenpox:** Laboratory diagnosis of varicella is not routinely required but may be useful in special circumstances, such as cases of atypical clinical presentation or severe disease, cases of certain adverse experiences after vaccination, when transmission of vaccine strain is suspected, or unusual outbreaks. Immunity testing of exposed contacts is not routinely recommended, although it may be recommended in certain circumstances (*e.g.*, for pregnant women and other high-risk contacts, and in healthcare settings or outbreaks).

a. Tests

Diagnostic **tests for recent chickenpox infection** include viral tests such as rapid VZV identification by direct fluorescent antibody (DFA), viral culture, viral strain identification (*e.g.*, polymerase chain reaction [PCR]), paired acute/convalescent serologic testing for IgG to VZV (the acute serum should be collected within 7–10 days of rash onset, the convalescent at least 7–14 days [preferably 2–3 weeks] later), and IgM capture ELISA.

Diagnostic **tests for immunity** include the following serologic tests: enzyme-linked immunosorbent assays (ELISA), latex agglutination (LA), indirect fluorescent antibody (IFA), fluorescent antibody to membrane antigen (FAMA), radioimmunoassay (RIA), and complement fixation (CF). Latex agglutination can be done quickly and may be the most useful post-exposure test.

b. Special Situations Where Additional Testing May Be Indicated

The Massachusetts State Laboratory Institute (SLI) does not normally test for varicella immunity or infection. Consultation with the Massachusetts Immunization Program (MIP) is recommended in the following unusual circumstances. The SLI or CDC may also provide or approve laboratory services in the following situations:

- **“Breakthrough” varicella in vaccinated individuals**
- **Post-vaccination events** (Examples: 1) rash with > 50 lesions 7–42 days post-vaccination; 2) suspected secondary transmission of the vaccine virus; 3) herpes zoster; and 4) any serious adverse event; *e.g.*, pneumonia, encephalitis, cerebral ataxia, etc.)
- **Varicella reinfections in unvaccinated individuals**
- **Atypical varicella both mild and severe**
- **Serologic testing in those with uncertain histories of varicella** (Under special circumstances, including certain outbreaks, the SLI may be able to perform immunity testing or arrange for immunity testing to be done at CDC in adolescents and adults with a negative or uncertain history of varicella.)

2. **Shingles:** Laboratory confirmation is not usually indicated. Serologic testing is not helpful. Immunity testing of exposed contacts is not routinely recommended, although it may be recommended in certain circumstances (*e.g.*, for pregnant women and other high-risk contacts, and in healthcare settings).

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting of Chickenpox

Although Massachusetts does not yet require reporting of individual cases of chickenpox, chickenpox surveillance and reporting are important in a number of respects:

- To monitor the impact over time of the vaccination program on age-specific incidence and severity of chickenpox.
- To evaluate vaccine efficacy under conditions of routine use and track instances of vaccine failure.
- To identify groups and areas in which risk of disease is highest so prevention and control efforts can be focused.
- To track and minimize the occurrence of infectious complications such as invasive group A streptococcal infection.

Note: Currently, the MDPH does not require **shingles** reporting.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the list of reportable diseases (at the end of this manual's introductory section) for information.

Note: In the future, healthcare providers may be expected to report cases of chickenpox in aggregate, by age group, based on clinical diagnosis alone.

Healthcare providers should also report any unusual or high-risk case(s), outbreaks, or settings **immediately** to their local board of health and the Division of Epidemiology and Immunization at (617) 983-6800 so that epidemiologists can assist with control measures. Examples: 1) case(s) with unusual presentations or severe complications (including invasive group A streptococcal infection, pneumonia, hospitalization, death), 2) immunocompromised case(s), 3) outbreaks involving adolescents and adults, 4) outbreaks among vaccinated populations (these may point to improper storage and handling of vaccine), 5) large outbreaks, 6) outbreaks in healthcare settings, 7) outbreaks in child care centers with infants, or 8) outbreaks in other high-risk institutional settings.

Deaths of which chickenpox was a contributing cause must also be reported. Currently, shingles cases do not need to be reported to the local board of health.

C. Local Board of Health Reporting and Follow-Up Responsibilities

Reporting

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300.100*) stipulate that each local board of health (LBOH) must report cases of chickenpox (see reporting criteria in Section 2) A [page 2]).

Note: A plan for enhanced aggregate reporting of chickenpox cases is currently under development and is expected to be initiated in 2001.

Submit aggregate reports (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:

Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

Individual case investigation is not yet required (except in the case of death from chickenpox*). However, any unusual or high-risk case(s), outbreaks, or settings should be reported **immediately** to the Division of Epidemiology and Immunization at (617) 983-6800 so that epidemiologists can assist with control measures. Examples are listed in 3) B above.

*Please note that **deaths**, where chickenpox was a contributing factor, must be reported; **MIP will complete the investigation of such deaths.**

4) CONTROLLING FURTHER SPREAD OF CHICKENPOX

Note: For specific guidelines on controlling chickenpox spread from *shingles*, see Section 5) below (page 8).

A. Isolation and Quarantine Requirements (105 CMR 300.200)—Chickenpox

Minimum Period of Isolation of Patient

Until lesions have dried and crusted, or until no new lesions appear; usually by the 5th day.

Minimum Period of Quarantine of Contacts

Neonates born to mothers with active varicella should be isolated from susceptibles and suspected susceptibles until 21 days of age. Healthcare workers shall be excluded from their occupations from the 8th through 21st days after their last exposure if they are susceptible. Anyone receiving varicella zoster immune globulin shall extend their exclusion to 28 days post-exposure. Otherwise, no restrictions.

B. Protection of Contacts of a Case of Chickenpox

1. **Rule out vaccine reaction as the cause of rash.** Ask about previous varicella vaccination and any recent exposure to chickenpox or shingles. A mild rash occurs in 1–5% of recipients of varicella vaccine, typically 1–3 weeks after vaccination. It is thought to be only rarely infectious. For help distinguishing wild-type disease and break-through chickenpox from vaccine reaction, see Attachment A: *Guidelines for Evaluating Chickenpox-like Rash in Recipients of Varicella Vaccine* (at the end of this chapter), which are applicable to a variety of settings, including daycare and school. (“Break-through” chickenpox is a less severe form of wild-type disease that can occur in vaccinated people who developed partial immunity.)
2. **Isolate the case** on contact precautions until all lesions have crusted over, usually by the 5th day after rash onset but sometimes longer in immunocompromised patients.
 - *Salicylates*: Children (≤ 18 years of age) with chickenpox should **not** receive salicylates, because they are associated with an increased risk of Reye syndrome.
 - *Antivirals*: Varicella and zoster may be treated with antiviral agents. The decision to use therapy and the duration and route of therapy should be determined by specific host factors, extent of infection, and initial response to therapy. *Note*: Oral acyclovir is **not** recommended for routine use in otherwise healthy children with varicella.
3. **Identify all those exposed.** “Exposure” to chickenpox is defined as: contact with nasopharyngeal secretions or lesions, face-to-face interaction, or sharing indoor airspace with an infectious person (*e.g.*, occupying the same classroom, the same 2- to 4-bed ward or adjacent beds in a large ward). Consider members of the following groups who may have been in contact with the case during his/her infectious period.
 - Household members
 - School/daycare students and staff (consider interaction patterns, staffing patterns, and possibilities of shared airspace, face-to-face contact, and saliva exchange).
 - Staff and patients of healthcare facilities (see Healthcare settings, Section 4) C. 2 [page 7])
 - Work place contacts (especially in daycare, school and healthcare settings – see Section 4) C. [pages 7-8])
 - Social and religious groups
 - Sports teams and extracurricular groups
 - Bus/carpool mates
 - Close friends
 - Persons potentially exposed at social events or travel sites
4. **Identify high-risk susceptibles among the exposed.** Susceptibles are those without proof of immunity as defined below.

Proof of Immunity to Varicella¹

- A reliable history of chickenpox or shingles (because the rash is distinctive and subclinical cases are rare, a recollection or record of past disease from the person in question [if adult], parent, or physician is sufficient *except* in school settings, where a physician-certified history of disease is required), or
- Documentation of prior vaccination against chickenpox (1 dose at 1–12 years of age or 2 doses ≥ 1 month apart at ≥ 13 years of age), or
- Serologic proof of immunity.

¹Bone marrow transplant recipients should be considered susceptible *regardless* of past history of disease.

- **Immunocompromised individuals** should be referred to their healthcare provider. These individuals have a higher risk of serious complications with chickenpox infection, including disseminated disease, resulting in multiple organ system involvement. Frequent complications include pneumonia and encephalitis. Immunocompromised persons (including HIV-infected persons) should receive VZIG as soon as possible if within 96 hours of exposure.
- **Susceptible pregnant women** should be referred to their obstetrician. These women may be at higher risk for serious complications than adults in general, and their fetuses are at risk for congenital varicella syndrome. Hence, VZIG is indicated for these women as soon as possible if within 96 hours of exposure. Whether the fetus is protected by VZIG is unknown.
- **Newborns** should receive VZIG (125U) as soon as possible if within 96 hours of exposure:
 - Newborns whose mother's onset of chickenpox occurred within the period of 5 days before delivery to 2 days after delivery should receive VZIG (125 U) as soon as possible after delivery.
 - Exposed hospitalized premature infants (≥ 28 weeks gestation) whose mother has no history of chickenpox or serologic proof of immunity should receive VZIG.
 - Exposed hospitalized premature infants (< 28 weeks of gestation or $\leq 1,000$ g), regardless of maternal history, should receive VZIG.
 - For healthy, full-term infants exposed postnatally to chickenpox (except those whose mother's rash developed between 5 days before delivery and 2 days after delivery), VZIG is **not** indicated, although it **may** be considered, depending on age and mother's immune status. The package insert should be consulted.

Notes on prophylaxis:

- a) The recommended dosage of VZIG is 125U per 10 kg given intramuscularly (min. 125U, max. 625U). Depending on the volume required, it may need to be given in divided doses. Please refer to the package insert.
 - b) If an individual has received VZIG or IVIG (400 mg/kg) ≤ 2 weeks after exposure, **no** additional immunoprophylaxis is necessary.
 - c) Receipt of varicella and MMR vaccines must be deferred for ≥ 5 months after receipt of VZIG. Please refer to Attachment C (at the end of this chapter).
 - d) Post-exposure use of acyclovir may be a less costly alternative or adjunct to the use of VZIG in some susceptible persons. However, additional data are needed concerning its prophylactic use in healthy and immunocompromised persons in all age groups.
5. **Recommend the exclusion of high-risk susceptible contacts** until one incubation period (21 days) after their last exposure (for their own protection) or, if they receive VZIG, 28 days after their last exposure (for the protection of others). After this time, they may return if no additional cases have been identified. If a healthcare setting is involved, see Section 4) C. 2 [page 7].
6. **Identify and vaccinate other exposed susceptibles.** Susceptibles are those with no reliable history of chickenpox or shingles, documentation of prior vaccination against chickenpox, or serologic proof of immunity. See Attachment B (located at end of this chapter) for information about some groups who should **not** receive varicella vaccine.

Recommend varicella vaccine to eligible, susceptible, exposed individuals in institutional settings (*e.g.*, daycare centers, schools, healthcare settings).

- **Varicella vaccine can prevent or modify disease if given within 3 days, and possibly up to 5 days, after exposure.**
- Vaccinating someone who is incubating chickenpox or is immune is not harmful.
- If vaccine is given following exposure, parents and others should be informed that chickenpox could occur in spite of vaccination.

7. **Supply potentially exposed individuals with information.** In institutional settings, including daycare centers and schools, provide potentially exposed attendees (or their parents) and staff with 1) written or verbal notice of the case or outbreak, 2) the MDPH *Chickenpox Fact Sheet*, 3) a letter encouraging and authorizing providers to use state-supplied varicella vaccine for eligible, susceptible, exposed individuals, and 4) the varicella Vaccine Information Statement (VIS). Review with staff and students the importance of careful handwashing, especially after touching discharges from nose, throat, or chickenpox lesions, and the importance of not sharing eating utensils or toys that are put into the mouth.
8. **Conduct surveillance for chickenpox for 21 days** (one incubation period) after the last exposure to chickenpox. For those who received VZIG and where immunocompromised individuals are involved, surveillance should continue for **28 days**.

C. Managing Chickenpox in Special Situations

1. Institutional settings where group A streptococcal infection is also present

Invasive group A streptococcal (GAS) infections as a complication following chickenpox are becoming more common. The MDPH has rigorous and detailed control measures for daycare centers and schools where varicella is accompanied by GAS, whether invasive or non-invasive. The central strategy involves rapid vaccination of exposed susceptibles—varicella vaccine can prevent or modify disease if given within 3 days, and possibly up to 5 days, after exposure—with antibiotic treatment where indicated. **Contact the Division of Epidemiology and Immunization immediately for assistance at (617) 983-6800.** Also, refer to the “Group A Streptococcus (Invasive)” chapter in this manual for more information about this infection.

2. Healthcare settings (including acute and long-term care facilities)

All susceptible healthcare workers should ensure that they are immune to chickenpox. Immunization is particularly important for susceptible healthcare workers who have close contact with persons at high risk for serious complications, including a) premature infants born to susceptible mothers, b) premature infants who are born at <28 weeks of gestation or who weigh $\leq 1,000$ g at birth (regardless of maternal immune status), c) pregnant women, and d) immunocompromised individuals. Healthy adolescents and adults are also at higher risk for complications; and healthy, full-term newborns born to susceptible mothers may be as well.

In healthcare institutions, serologic screening of personnel who have a negative or uncertain history of chickenpox before vaccinating is likely to be reliable and cost-effective. Routine testing for chickenpox immunity after two doses of vaccine is not necessary because 99% of adults are seropositive after the second dose. Seroconversion, however, does not always result in full protection against disease. For vaccinated healthcare workers who are subsequently exposed to chickenpox (or shingles), the following measures should be considered:

- **Test** for serologic immunity immediately after chickenpox exposure (the LA test is fast).
 - **Retest** 5–6 days later to determine if an anamnestic response (boosting of antibody titers) is present.
 - **Exclude or reassign** personnel who do not have detectable antibody.
- a. **Isolate/exclude the case** until all lesions have crusted over, usually by the 5th day after rash onset but sometimes longer in immunocompromised individuals. Inpatients with varicella should be placed on airborne precautions (negative pressure room).
 - b. **Identify all those exposed.** “Exposure” to chickenpox is defined as: contact with nasopharyngeal secretions or lesions, face-to-face interaction, or sharing indoor airspace with an infectious person (*e.g.*, occupying the same 2- to 4-bed ward or adjacent beds in a large ward).
 - c. **Identify high-risk susceptible patients/staff among the exposed.** Refer to Section 4) B. 4-5 [pages 5-6], about exposed high-risk susceptible groups and use of VZIG. High-risk susceptible patients/staff exposed to a case of chickenpox (or shingles) should receive VZIG as soon as possible if within 96 hours of exposure.

- d. **Identify and vaccinate other exposed susceptibles.** Susceptibles are those without a reliable history of chickenpox or shingles, documentation of prior vaccination against chickenpox, or serologic proof of immunity. See Attachment B for information about some groups who should **not** receive varicella vaccine. Recommend varicella vaccine to eligible, susceptible, exposed staff/patients. **Varicella vaccine can prevent or modify disease if given within 3 days after exposure.** Vaccinating someone who is incubating chickenpox or is immune is not harmful. If vaccine is given following exposure, recipients should be informed that chickenpox could occur in spite of vaccination.
- e. **Discharge or isolate exposed susceptible patients.** Discharge all exposed, susceptible patients as soon as possible. Isolate on airborne precautions all such patients who cannot be discharged from day 8 to day 21 after exposure. Those who have received VZIG must remain in isolation until day 28. Newborns born to mothers with active chickenpox should be isolated from susceptibles until 21 days of age if they do not receive VZIG or until 28 days of age if they do.
- f. **Exclude exposed susceptible healthcare personnel.** Decisions about excluding exposed susceptible staff will depend on such factors as the setting (*e.g.*, neonatal unit vs. long-term care facility for elderly), degree of direct patient contact, and whether or not the staff person received vaccine within 3 days of exposure. The recommendation to use vaccine as post-exposure prophylaxis is recent (1999) and there is not much experience with its use in high-risk settings. Our basic recommendation is to exclude all exposed susceptible staff from direct patient contact and possibly from the entire workplace from day 8 to day 21 after exposure. Exclusion of VZIG recipients should be extended to 28 days after exposure.
- g. **Consider testing exposed immunized staff.** After receiving 2 doses of varicella vaccine, 99% of adults are seropositive. However, since seroconversion does not always result in complete protection against disease, testing vaccine recipients for seropositivity immediately after exposure and retesting 5 to 6 days later for an anamnestic response is a potentially effective strategy for identifying those who remain at risk for varicella.
- h. **Conduct surveillance for chickenpox for 21 days** (one incubation period) after the last exposure to chickenpox. For those who received VZIG and where immunocompromised individuals are involved, surveillance should continue for **28 days**.

5) CONTROLLING CHICKENPOX SPREAD FROM SHINGLES

A. Isolation and Quarantine Requirements (150 CMR 300.200)—Shingles

There are no isolation or quarantine requirements for shingles.

B. Protection of Contacts of a Case of Shingles

In their lesions, individuals with shingles carry the virus that causes chickenpox. Therefore, persons with shingles must be very careful about personal hygiene and wash their hands if they touch their lesions. In otherwise healthy individuals, lesions that are covered appear to pose little risk to susceptible individuals. Unless the shingles rash can be completely covered, it is advisable that individuals with shingles stay home until the rash is crusted over and dry. Children with shingles whose lesions cannot be covered should be excluded from daycare/school until their lesions have crusted.

Those with disseminated shingles and immunocompromised people with either localized or disseminated shingles can transmit chickenpox virus via the airborne route and should stay home or, if in the hospital, on airborne and standard precautions for the duration of the illness.

“Exposure” to uncomplicated shingles is defined as: contact with lesions; for example, through close patient care, touching, or hugging. “Exposure” to disseminated shingles and localized or disseminated shingles in an immunocompromised person is defined as: 1) contact with lesions; for example, through close patient care,

touching, or hugging, or 2) sharing indoor airspace (*e.g.*, occupying the same 2- to 4-bed ward or adjacent beds in a large ward).

Control measures are the same as for chickenpox in Section 4) B. 3–8 [pages 5-7] and include vaccination of eligible, susceptible contacts.

C. Managing Shingles in Healthcare Settings (including acute and long-term care facilities)

All susceptible healthcare workers should ensure that they are immune to chickenpox. Immunization is particularly important for susceptible healthcare workers who have close contact with persons at high risk for serious complications, including a) premature infants born to susceptible mothers, b) premature infants who are born at <28 weeks of gestation or who weigh $\leq 1,000$ g at birth (regardless of maternal immune status), c) pregnant women, and d) immunocompromised individuals. Healthy adolescents and adults are also at higher risk for complications; and healthy, full-term newborns born to susceptible mothers may be as well.

In healthcare institutions, serologic screening of personnel who have a negative or uncertain history of chickenpox before vaccinating is likely to be reliable and cost effective. Routine testing for chickenpox immunity after two doses of vaccine is not necessary because 99% of adults are seropositive after the second dose. Seroconversion, however, does not always result in full protection against disease. For vaccinated healthcare workers who are subsequently exposed to shingles (or chickenpox), the following measures should be considered:

- **Test** for serologic immunity immediately after chickenpox exposure (the LA test is fast)
- **Retest** 5–6 days later to determine if an anamnestic response (boosting of antibody titers) is present
- **Exclude or reassign** personnel who do not have detectable antibody.

1. Prevent exposure to the case, as follows:

Staff

- **Staff with localized shingles** should cover lesions and should not care for high-risk patients until their skin lesions have become dry and crusted.
- **Staff with disseminated shingles and immunocompromised staff with shingles** should be excluded for the duration of their illness.

Patients

- **Patients with localized shingles** should be cared for using standard precautions (including but not limited to handwashing, gloves, masks and eye protection during activities likely to generate splashes, nonsterile gowns) until all lesions are crusted. Current or prospective roommates should be immune or get vaccinated.
- **Patients with disseminated shingles and immunocompromised patients with shingles** (either localized or disseminated) require airborne and contact precautions for the duration of the illness.

2. Identify all those exposed.

- “Exposure” to uncomplicated shingles is defined as: contact with lesions; for example, through close patient care, touching, or hugging.
- “Exposure” to disseminated shingles and localized or disseminated shingles in an immunocompromised person is defined as: 1) contact with lesions; for example, through close patient care, touching, or hugging, or 2) sharing indoor airspace with the infectious person (*e.g.*, occupying the same 2- to 4-bed ward or adjacent beds in a large ward).

3. Identify high-risk susceptible patients/staff among the exposed. Refer to Section 4) B. 4–5 [pages 5-6], about exposed high-risk susceptible groups and use of VZIG. High-risk susceptible patients/staff exposed to a case of shingles (or chickenpox) should receive VZIG as soon as possible if within 96 hours of exposure.

4. **Identify and vaccinate other exposed susceptibles.** Susceptibles are those without a reliable history of chickenpox or shingles, documentation of prior vaccination against chickenpox, and serologic proof of immunity. See Attachment B (at end of this chapter) for information about some groups who should **not** receive varicella vaccine. Recommend varicella vaccine to eligible, susceptible, exposed staff/patients. **Varicella vaccine can prevent or modify disease if given within 3 days, and possibly up to 5 days, after exposure.** Vaccinating someone who is incubating chickenpox or is immune is not harmful. If vaccine is given following exposure, recipients should be informed that chickenpox could occur in spite of vaccination.
5. **Discharge or isolate exposed susceptible patients.** Discharge all exposed, susceptible patients as soon as possible. Isolate on airborne precautions all such patients who cannot be discharged from day 8 to day 21 after exposure. Those who have received VZIG must remain in isolation until day 28. Newborns exposed to shingles should be isolated from susceptibles until 21 days of age if they do not receive VZIG or until 28 days of age if they do.
6. **Exclude exposed susceptible healthcare personnel.** Decisions about excluding exposed susceptible staff will depend on such factors as the setting (*e.g.*, neonatal unit versus long-term care facility for elderly), degree of direct patient contact, and whether or not the staff person received vaccine within 3 days of exposure. The recommendation to use vaccine as post-exposure prophylaxis is recent (1999) and there is not much experience with its use in high-risk settings. The MDPH recommendation is to exclude all exposed susceptible staff from direct patient contact and possibly from the entire workplace from day 8 to day 21 after exposure. Exclusion of VZIG recipients should be extended to 28 days after exposure.
7. **Consider testing exposed immunized staff.** After receiving 2 doses of varicella vaccine, 99% of adults are seropositive. However, since seroconversion does not always result in complete protection against disease, testing vaccine recipients for seropositivity immediately after exposure and retesting 5 to 6 days later for an anamnestic response is a potentially effective strategy for identifying those who remain at risk for varicella.
8. **Conduct surveillance for chickenpox for 21 days** (one incubation period) after the last exposure to shingles. For those who received VZIG and where immunocompromised individuals are involved, surveillance should continue for **28 days**.

D. Preventive Measures

Vaccination, including routine childhood vaccination, catch-up vaccination of adolescents, and targeted vaccination of high-risk adult groups, is the best preventive measure against chickenpox and subsequent shingles. Good personal hygiene (which consists of proper handwashing, disposal of used tissues, not sharing eating utensils, etc.) is also important. Please refer to the most current versions of: the ACIP statements on varicella (listed under References, below), MDPH's *Immunization Guidelines*, and MDPH's *Massachusetts Immunization Program-Supplied Vaccines and Patient Eligibility Criteria* for details about varicella vaccine, the recommended schedule, who should and shouldn't get the vaccine, and who is eligible to receive state-supplied vaccine. These as well as other relevant resources are available through the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

A *Chickenpox (Varicella) Public Health Fact Sheet* for the general public can be obtained from the Division of Epidemiology and Immunization or through the MDPH website at <http://www.state.ma.us/dph/>. Click on the "Publications" link and scroll down to the Fact Sheet section.

ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for varicella. It is provided for your information only; it is not necessary to use this information for reporting or investigating cases. (CDC case definitions are

used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2) A (pages 2-3).

Case Definition for Varicella (as defined by CSTE, 1999)

Clinical case definition

An illness with acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause.

Laboratory criteria for diagnosis

- isolation of varicella-zoster virus (VZV) from a clinical specimen, or
- direct fluorescent antibody (DFA), or
- polymerase chain reaction (PCR), or
- significant rise in serum varicella immunoglobulin G antibody level by any standard serologic assay.

Case classification

Probable: a case that meets the clinical case definition, is not laboratory confirmed and is not epidemiologically linked to another probable or confirmed case.

Confirmed: a case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case.

Comments:

- Two probable cases that are epidemiologically linked would be considered confirmed, even in the absence of laboratory confirmation.
- In vaccinated persons who develop varicella more than 42 days after vaccination (breakthrough disease), the disease is almost always mild with fewer than 50 skin lesions and shorter duration of illness. The rash may also be atypical in appearance (maculopapular with few or no vesicles).
- Laboratory confirmation of cases of varicella is not routinely recommended; laboratory confirmation is recommended for fatal cases and in other special circumstances.

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Attachment A: Guidelines for Evaluating Chickenpox-like Rash in Recipients of Varicella Vaccine in Day Care and School Settings (2 pages)

Attachment B: Special Considerations in the Administration of Varicella Vaccine (2 pages)

Attachment C: Suggested Intervals Between Administration of Immunoglobulin Preparations and Measles-Containing and Varicella Vaccines (1 page)

Note: These attachments are separate PDF files. To access them, go back to the *Guide to Surveillance and Reporting* main page, click on the A–C drop down menu, and each attachment is listed under Chickenpox.